Chapter 3
CREATING INPUT FOR THE TRAFFIC FORECAST MODEL

TranPlan, the traffic forecasting model we use to generate future traffic volumes, requires four kinds of socioeconomic data to do its work: numbers of persons, numbers of households, numbers of vehicles available, and numbers of jobs. These numbers, estimated and projected, must be supplied for each traffic zone within the County, and for each key year in the planning process. For us, that meant 1999 -- the base year for calibrating the model -- 2010, and 2025.

TranPlan generates traffic volumes by mathematically interrelating all four kinds of input data. The theory behind the interrelationship is simple: given a network of roads to travel on, if TranPlan knows where people live, where they need to get to, and how many vehicles they have to get there, then TranPlan can tell us what roads they will take, and in what numbers.

We could not distribute the input to each of the 199 traffic zones within the County as a whole, without an accepted guide to community growth. The Land Use Element of the adopted ***Comprehensive Plan*** fulfills that function.

This chapter then describes how we arrived at the numbers we used as inputs for the traffic-forecasting model and how we distributed them within the 199 traffic zones. Socioeconomic data for Tippecanoe County, 1999 to 2025 projected, is summarized in **Table 2**. The reader can find the full set of input data for the 1999 base year, 2010, and 2025 by traffic analysis zone in **Appendix 2** at the end of this report.

Table 2

Socioeconomic data, Tippecanoe County: 1970 – 2025 Projected

Component	1970	1980	1990	1999	2010	2025
Population	109,378	121,702	130,598	149,654	168,193	195,715
Households	32,320	40,681	45,618	54,812	63,285	74,690
Vehicles	49,053	68,460	83,690	99,624	114,306	134,070
Total Employment	52,015	64,915	80,290	95,976	110,811	130,781
Retail	8,577	10,831	14,335	17,136	23,854	28,153
Non-Retail	43,438	54,084	65,955	78,840	86,957	102,628

Source: U.S. Department of Commerce: Bureau of the Census, Census of Population and Housing, 1970,1980. And 1990, and Bureau of Economic Analysis, Regional Economic Information Systems, 1970 – 1990; Division of Housing and Food Services, Purdue University, 1990; APC Land Use Survey,1999; and APC Staff Analysis, February 2000

EMPLOYMENT

After researching various data sources available, Staff decided to use Bureau of Economic Analysis (BEA) employment data as the starting point. The US Department of Commerce develops this data. We chose BEA data because it is very comprehensive. Not only does it include full time workers, it also includes part time workers as well as sole proprietors.

The most recent BEA data released for Tippecanoe County was for 1997. Therefore we needed to work up to our base year 1999. By using a simple trend analysis over a 28 year period, 1969 to 1997, we estimated that there were 95,976 jobs in Tippecanoe County in 1999.

We also assumed that a change in employment between the projected time horizons was a function of that same trend analysis. As indicated in **Table 2**, employment estimates for 2010 and 2025 are 110,811 and 130,791 respectively.

TranPlan requires that employment figures be divided into "retail" and "non-retail" components before being inputted into the model. The 1997 BEA figures show that retail workers represented 17.9% of all workers. We started with that percentage. Our projections show an increasing percentage of retail jobs, with the retail component representing about 22% of all jobs by 2025. This is based, in part, on developments tracked by the Plan Commission through the zoning and nonresidential land division processes. We also drew upon the expertise of our local economic development organizations to assist us in projecting job growth.

DWELLING UNITS

As of 1999, we knew almost exactly how many dwelling units there were in the County, because we had just counted them. As part of our ongoing program of data collection, we conduct a "windshield survey" of the entire county about every 10 years. We drove all highways, streets, private drives and alleys, and noted every home and apartment we found. There were 57,819 dwelling units ("DUs") in the county when we began the input phase of this study in Spring, 1999. That served as our base year data.

We corroborated the windshield count by using U. S. Bureau of the Census and building permit data. As a starting point, the 1990 Census counted 48,134 housing units in Tippecanoe County on April 1, 1990. By taking into account housing units added and lost (through demolition or conversion) after the official Census Bureau count, we determined that the windshield survey fell within a two-percent level of accuracy.

We know from the 1990 Census of Housing that 94.8% of all housing units in Tippecanoe County were occupied. If we assume a similar occupancy rate for 1999, then a total of 54,812 housing units were occupied.

POPULATION

Since we were a year shy of the 2000 Census, we needed another source for our base year population. After searching, we decided to estimate the 1999 population based on data in hand that could be easily corroborated. We chose two factors: average household size and number of housing units.

We first estimated the average number of persons per household for 1999. This average has changed over the past decades. It has continually dropped from 3.00 in 1970 to 2.50 in 1990. We assumed that household size continued to decrease but at a slowing rate. We settled at about 2.43 persons per household for our 1999 base year.

With 54,812 households, each occupied on average by 2.43 persons, household population in 1999 would have been over 133,142, up over 19,000 people from the 1990 Census count. We also assumed a relatively constant group quarter population of about 16,512 in 1999. Thus we estimated the total population of Tippecanoe County in 1999 to be about 149,654.

Our next step was projecting base year dwelling units and population to 2010 and 2025. The trend of employment growth in the county, among other factors, was the key element in our projections. We assumed that total number of households for the forecast periods is a function of change in employment. We also made other assumptions including:

- average household size levels off at 2.40 for the forecast periods;
- the percent of occupied housing units remain constant at the 1990 level;
- group quarter population remains constant at the 1990 level; and
- vehicles per household and vehicles per person in group quarters remains constant at the 1990 level.

We anticipate this housing to be built within the "Residential Expansion Sectors" identified in the ***Adopted Lane Use Plan*** and ***Housing Element*** of ***The Comprehensive Plan*** (as amended). The Plan promotes a compact development pattern. Sufficient land is programmed into the Plan to house half again as many persons as now live in Tippecanoe County. Yet, areas of

prime farmland have been identified and earmarked for continued agricultural usage. Residential expansion areas include:

- from the southern urban boundary down to Wea Creek in Wea Township (with some overlap into Fairfield Township);
- from the eastern urban boundary to Wildcat Creek, beyond the intersection of I-65 and SR 26 East in Fairfield Township and western Perry Township;
- from the northern and western urban boundary into Wabash Township;
- around the small towns of Battle Ground, Clarks Hill, and Dayton; and
- within the Cities of Lafayette and West Lafayette and the small towns through infilling and intensification.

We are planning for over 66,700 housing units in 2010, and, at 95 percent occupancy, over 63,200 households. By 2025 we would expect 78,700 housing units occupied by over 74,600 households. We assume that the average household size will decrease to 2.40 in 2010 and remain there in 2025. And, we maintain our assumption that group quarter population will remain unchanged. Our projection of population for 2010 is over 168,100 persons and over 195,700 by 2025.

VEHICLES AVAILABLE

TranPlan requires us to input information on non-business vehicles in the form of vehicles available. We used 1990 Census data as our base. From this data, we had a count of the number of vehicles available for use by household members. Since the data only reflect vehicles used by households, and not persons living in group quarters, staff obtained counts of vehicles registered to students living in Purdue University residence halls by residence hall.

The Bureau of the Census counted over 79,000 vehicles for use by households in 1990. The average household in the county had 1.74 vehicles. This ratio was increased only slightly in projecting vehicles used by household occupants for each of our key years. We hypothesized that a continuing increase in vehicles per household would be offset by a continuing decrease in the number of persons per household. We multiplied the ratio for each traffic zone based on 1990 data by the number of projected households per traffic zone for each key year. We added to that factor, the number of vehicles registered to University students. This number was held constant throughout the planning period based on our assumption that group quarter population, including persons living in college dormitories, would remain constant.

DISTRIBUTION BY TRAFFIC ZONES

Our first task was to assign base year data on housing units to traffic zones. This was done by superimposing traffic zone boundaries on aerial photos we used in collecting land use data during our 1999 windshield survey. We simply counted the number of dwelling units in each zone.

We distributed employment data using the Dunn and Bradstreet Employment database provided to us by INDOT. Since it was based on 1997 data, we updated it by using the Land Use Survey information, Greater Lafayette Area Chamber of Commerce employment surveys, Polk Directory, and by telephone surveys.

Before distributing future dwelling units, we compiled a list of proposed subdivisions and planned developments. It included developments nearing completion to those still in the conceptual stage. We discovered that the total number of proposed dwelling units far exceeded our 2010 target.

Therefore we staged the list over the full twenty-five years and not the first eleven. Those subdivisions nearing full build out, close to or nearing ground breaking were phased first.

With base year data mapped, and projections in hand for retail and nonretail jobs for 2010, we invited representatives of our local jurisdictions to join us in distributing them by traffic zones. Distributing jobs for 2025 was handled differently. We identified specific zones where future employment would locate. Each zones size was calculated and future employment was then distributed by size of zone.

The **Land Use Element** of the adopted **Comprehensive Plan** continued to serve as our guide. It projects locations for residential, commercial and industrial expansion, while identifying those portions best suited to open space and agricultural uses. It was developed within the context of the previously noted goals and objectives that form the basis for our comprehensive planning efforts.

The full set of input data – covering population, DUs, retail and nonretail employment and autos/DU for the base year, 2010 and 2025 – can be found in **Appendix 2** at the end of this report.